WHAT IS CLAIMED IS:

1. A network switch comprising:

a plurality of input ports configured to receive data forming one or more packets;

a plurality of output ports configured to convey the packets out of the switch, wherein each output port comprises a plurality of output queues;

a random access memory; and

data transport logic coupled between the input ports, the output ports, and the memory,

wherein a first input port is configured to request cut-through routing from at least one destination output port in response to receiving data corresponding to a first packet that is a candidate for cut-through routing,

wherein, in response to receiving a signal granting cut-through from the destination output port, the input port is configured to route the data corresponding to the first packet to the destination output port via the data transport logic, and wherein in response to not receiving the signal granting cut-through the input port is configured to store (a) the data to the shared memory via the data transport logic and (b) a packet identifier to one of the output queues,

[wherein, in response to not receiving the grant cut-through signal, the input port is configured to store a packet identifier on one of the destination port's output queues,] and

wherein the first input port is configured to store a time value for each output port, wherein the time value corresponds to the last time that the first input port added a packet identifier to one of the destination output port's output queues.

2. The network switch as recited in claim 1, wherein the first input port is configured to compare the stored time value for the destination port with a current time for the first packet, wherein the first input port is configured to refrain from requesting cut-through routing for the first packet if the current time is less than a predetermined delay time from the stored time value.

3. The network switch as recited in claim 1, wherein each input port is configured to track the time values and refrain from requesting cut-through routing for a particular cut-through candidate packet if the time values indicate that the particular cut-through candidate packet could be output before a previous packet.

4. The network switch as recited in claim 1, wherein the output port is configured to prevent a second, later-received packet having a same destination port as the first packet from being cut-through if the first packet has not already been received by the output port.

5. The network switch of claim 1, wherein the destination output port is configured to check each of the destination output port's output queues for packet identifiers before conveying the grant cut-through signal.

6. The network switch of claim 1, wherein each output port comprises control logic, an output FIFO, and an availability register, wherein the availability register is configured to store a value that the output port control logic compares with the amount of storage available in the output FIFO to determine if the signal granting cut-through should be transmitted.

7. The network switch as recited in claim 1, wherein the packet identifier is a number useable to identify a particular packet within the network switch.

8. The network switch as recited in claim 1, wherein the destination output port is configured to prevent a second, (sequent)packet from being cut-through if said first packet was not cut-through and has not already been received by the output port.

9. A network switch comprising:

a plurality of input ports configured to receive data forming one or more packets; 405

a plurality of output ports 460 configured to convey the packets out of the switch, wherein each output port comprises a plurality of output queues; 462

a random access memory; and 440

data transport 426 logic coupled between the input ports, the output ports, and the memory, wherein each input port has a plurality of sequences, wherein the first input port is configured to assign a sequence number to each received packet, wherein the sequence number accompanies the packet through the switch, wherein each output port is configured to store a last maximum sequence number (LMSN) for each input port register, wherein a first input port is configured to request cut-through routing from a first output port in response to receiving data corresponding to a first packet, and wherein the destination output port is configured to compare (a) the sequence number of the first packet with (b) the stored LMSN for the corresponding input port.

10. The network switch of claim 9, wherein the LMSN's stored by each output port are updated by the output port in response to the output port scheduling a particular packet having a sequence number greater than the stored LMSN for the corresponding input port, wherein the output ports are configured to update the stored LMSN's by replacing them with the sequence number of the particular packet.

11. The network switch of claim 9, wherein the output port is configured to ensure that the output queue corresponding to the first packet is empty before granting a cut-through signal.

12. The network switch of claim 9, wherein the output port is configured to ensure that all output queues are empty before conveying a grant cut-through signal.

13. The network switch of claim 9, wherein each of the plurality of sequences corresponds to a particular output port.

14. The network switch as recited in claim 9, wherein the packets have variable lengths.

15. The network switch as recited in claim 9, wherein said switch is configurable to disable cut-through routing to a particular output port if any data corresponding to an earlier-received packet to be routed to the particular packet's destination output port is stored in the memory.

16. A network switch comprising:

a plurality of ports, wherein a first one of said ports is an input port configured to receive data forming a packet, wherein a second one of said ports is an output port configured to convey the packet out of the switch, wherein the output port comprises an output first-in first-out memory (FIFO);

a random access memory (RAM); and

a means for routing the data between the input port, the RAM, and the output port, wherein the means for routing is configured to either route the packet directly to the output FIFO by cut-through routing or route the packet to the RAM for either early forwarding or store and forward routing, wherein the means is configured to route the data from the input port to the output port in response to detecting a cut-through grant signal from the output port, wherein the means is configured to store the data to the RAM in response to not receiving the cut-through grant signal from the output port, wherein the input port is configured to store a time value for the output port, wherein the time value corresponds to

the last time that the input port added a packet identifier to one of the output port's output queues.

17. The network switch as recited in claim 16, wherein the first input port is configured to compare the stored time value for the destination port with a current time for the first packet, wherein the first input port is configured to refrain from requesting a cut-through routing for the first packet if the current time is less than a predetermined delay time from the stored time value.

18. The network switch as recited in claim 16, wherein the input port is configured to track time values and refrain from requesting cut-through routing for a particular packet if the input port's time values indicate that the particular packet could be output by the output port before a previous packet.

19. The network switch as recited in claim 18, wherein the previous packet was not cut-through routed.

20. The network switch as recited in claim 16, wherein the output port is configured to prevent a second packet arriving at the input port after the first packet, from being cut-through routed if the first packet has not already been received in the output port.

21. The network switch of claim 16, wherein the output port comprises a plurality of output queues, and wherein the output port is configured to check each of the output queues for packet identifiers before allowing the input port and data transport logic to perform cut-through routing.

22. The network switch as recited in claim 16, wherein the output port comprises a plurality of output queues to which packets are assigned, wherein the input port is configured to assign a sequence number to each received packet, wherein the sequence number accompanies the packet through the switch, wherein the output port is configured to store the sequence number of an immediately preceding packet that was stored to the RAM and

destined for the output port, and wherein the output port is configured to compare (a) the sequence number of the packet for which the input port is requesting cut-through routing, with (b) the stored sequence number for a previous packet from the same input port and assigned to the same queue.

23. The network switch as recited in claim 22, wherein the destination output port is configured to refrain from conveying the signal granting cut-through if the difference of (a) and (b) is greater than one.

24. A method for switching packets in a network switch having a plurality input ports and output ports, the method comprising:

receiving data forming a first packet at a first input port, wherein the first packet is to be routed to at least a first output port; and

switching the packet by cut-through routing or early-forwarding, wherein cut-through routing is performed only if (a) no previous packets received at the first input port and destined for the first output port have not been received at the first output port, and (b) the first output port has resources available to handle the data.

25. The method of claim 24, wherein early-forward routing is performed by storing the data to a memory, and, in response to detecting that the memory has resources to handle the data, forwarding the packet to the output port from the memory.

26. The method of claim 25, wherein the forwarding begins before the storing is complete.

27. The method of claim 24, further comprising:

assigning a sequence number to each received packet, wherein each input port has a different sequence for each output queue and output port,

storing a last maximum sequence number (LMSN) for each output queue for each input port, and

comparing (a) the sequence number of a packet for which the first input port is requesting cut-through routing, with (b) the destination output port's stored LMSN for the first input port, to determine if cut-through routing is to be performed.

28. The method of claim 24, further comprising:

assigning a sequence number to each packet received at each input port, wherein a different sequence is used for each input port/output port combination;

storing a last maximum sequence number (LMSN) for each output port and input port combination;

checking to ensure that the LMSN storedfor a particular output port and input port combination that corresponds to a particular input port that is requesting cut-through routing for a particular packet, is within one of the stored LMSN for that output port and input port combination; and

checking to ensure that all output queues for a particular output port are empty before performing cut-through routing to the particular output port.